

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
22 September 2005 (22.09.2005)

PCT

(10) International Publication Number
WO 2005/088274 A1

(51) International Patent Classification⁷: **G01N 21/39**,
G01J 3/42, G01N 21/35

(21) International Application Number:
PCT/GB2005/050036

(22) International Filing Date: 15 March 2005 (15.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0405820.2 15 March 2004 (15.03.2004) GB

(71) Applicant (for all designated States except US):
EVANESCO Ltd [GB/GB]; Forde Courte, Forde Road,
Newton Abbot TQ12 4AD (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **SHAW, Andrew Mark**
[GB/GB]; 8 Trehill House, Kenn, Exeter Devon EX6 7XJ
(GB).

(74) Agent: **Marks & Clerk**; 66-68 Hills Road, Cambridge
Cambridgeshire CB2 1LA (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

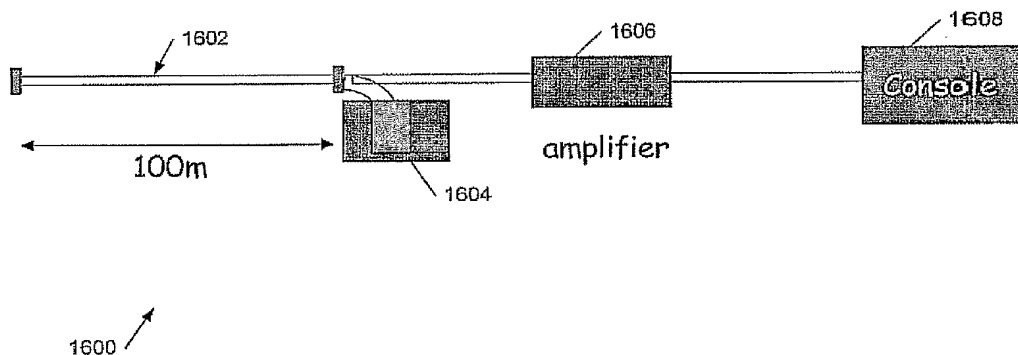
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: CAVITY RING-DOWN SENSING APPARATUS AND METHODS



(57) **Abstract:** This invention is generally concerned with apparatus and methods for sensing based upon evanescent-wave cavity ring-down spectroscopy (CRDS), in particular time-resolved and multiplexed sensing techniques. We describe an evanescent wave cavity-based optical sensor, the sensor comprising: an optical cavity formed by a pair of highly reflective surfaces such that light within said cavity makes a plurality of passes between said surfaces, an optical path between said surfaces including a reflection from a totally internally reflecting (TIR) surface, said reflection from said TIR surface generating an evanescent wave to provide a sensing function; a light source to inject a pulse of light into said cavity; a detector to detect decaying oscillations of said light pulse within said cavity; and a signal processor coupled to said detector and configured to provide a time-resolved output responsive to a light level within said cavity and having a time-resolution corresponding to a set of said light pulse oscillations, whereby said sensing function operates at substantially said time-resolution. We further describe a system where one or more TIR surfaces are provided with at least two functionalising materials responsive at different wavelengths such that an interaction between a said functionalising material and one or more targets to be sensed is detectable as a change in absorption of a said evanescent wave at a said wavelength.

WO 2005/088274 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.